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RECORDS OF AMPHIBIANS AND REPTILES
FOR
DELAWARE, MARYLAND AND VIRGINIA*

III. VIRGINIA

A few specimens were received from the late C. Few Seiss, collected in Virginia. A small collection was obtained at Deerfield, Augusta County, June 23, 1919. I collected in Accomac County at Locustville, May 14, 1911 and at Chincoteague, Assateague and Wallops Island, May 4 to 7, 1912; in Loudoun County, August 6, 1916, mostly along Piney Creek.

Under the title "The Spade-foot Toad in Virginia" I published† an account of an example secured at Tappahannuk.

Notophthalmus viridescens (Rafinesque).

Virginia, from C. Few Seiss.

Eurycea rubra (Sonnini).

Deerfield.

Desmognathus fusca (Rafinesque).

Deerfield.

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† Copeia No. 55, Mar. 19, 1918, p. 44.

- Bufo fowleri* Garman.
 Piney Creek, Harper's Ferry, Chincoteague.
Acris gryllus (Le Conte).
 Locustville.
Rana catesbeiana Shaw.
 Locustville.
Rana clamitans Latreille.
 Locustville, Wallops Island.
Rana palustris Le Conte.
 Deerfield.
Rana pipiens Schreber.
 Chincoteague, Assateague.
Sceloporus undulatus (Latreille).
 Richmond from C. Few Seiss; Deerfield.
Plestiodon fasciatus (Linné).
 East Falls Church.
Diadophis punctatus (Linné).
 Deerfield.
Heterodon contortrix (Linné).
 Locustville, Assateague, Wallops.
Opheodrys aestivus (Linné).
 Locustville, Wallops.
Coluber constrictor Linné.
 Locustville, Assateague, Wallops.
Lampropeltis triangulum (Linné).
Natrix sipedon (Linné).
 Piney Creek, Locustville, Wallops.
Virginia valeriae Baird & Girard.
 Hog Island.
Kinosternon subrubrum (Lacépède).
 Locustville, Chincoteague, Wallops.
Chelydra serpentina (Linné).
 Locustville, Chincoteague.
Clemmys guttata (Schneider).
 Chincoteague.
Chrysemys picta (Schneider).
 Locustville, Chincoteague.

Pseudemys rubriventris (Le Conte).
Harper's Ferry.

Caretta caretta (Linné).
Old Point Comfort, Virginia Beach.

HENRY W. FOWLER

FEEDING THE PADDLEFISH*

There has been much discussion of the Paddlefish (*Polyodon spathula*) ever since this curious creature was first discovered. Much curiosity has been aroused concerning the use of the strange paddle-like appendage on its snout. There has been less chance for direct observation of habits, etc. than with most fish because it lives usually in turbid streams and because it has been found very difficult to keep it alive in aquariums. Recently, through a chain of fortunate circumstances it was possible to keep a specimen alive in the Lincoln Park Aquarium, Chicago, for more than a year. After a time this fish started feeding and remained in good, though not fat, condition until the accident which caused its death.

One of the suppositions regarding the use of the "paddle" has been that it was used to strike the water plants through which the fish was swimming and so jar loose the creatures on which it wished to feed. Observation in the aquarium neither confirmed nor disproved this. The "paddle" is immovably fastened to the head, and the two together make up a solid body more than half the length of the fish. In ordinary swimming this moves straight ahead with no apparent side sway. In making a turn this whole body is turned very quickly and the fish then resumes its straight forward movement. It would be possible to strike a rather violent blow with the edge of this organ and its worn and scarred condition in old individuals suggests some such use.

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For a considerable time the fish refused all food. It was received at the aquarium in the fall and did not eat at all until spring. Finally Mr. F. S. Young, superintendent of the aquarium, was able to secure a large amount of entomostraca (mostly *Daphnia*) which he put in the aquarium. The fish ate these and continued feeding regularly until cold weather stopped the collecting of living food.

When a tub of *Daphnia* was put in the aquarium the fish paid no attention for some time. Usually it continued its regular swimming until the crustaceans were pretty well distributed through the water. There was nothing to indicate whether it learned of their presence through the tactile organs on the snout or through getting some in its mouth in breathing. As soon as it realized that there was food available it would swim more rapidly with the mouth held wide open. When a sufficient amount had accumulated it would close its mouth and seem to swallow. Then it would open and swim around. This was continued until all the living crustaceans had been captured or, at least, until they became too few to make it worth while to try for the others.

When living food could no longer be obtained the fish refused food for a time until finally Mr. Young conceived the idea of putting a large number of aerators into the tank so that very strong currents were produced. Then very finely chopped liver was thrown in. The currents kept this in suspension. At first the fish did not like this very well but finally came to eating it almost as readily as living food.

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FEEDING THE MUSKALONGE*

During the past few years two public aquariums in Chicago have furnished many opportunities to study the feeding habits of various game fishes. One of the best subjects for observation is a large Northern Muskalonge (*Esox immaculatus* Garrard) which has been in captivity in this city for nearly or quite ten years and is now in the Lincoln Park aquarium. When this fish is feeding, it takes small fish so quickly that it is not possible to see how it is done and there is probably no special procedure. A Carp weighing a pound and a half or thereabouts requires more careful treatment. At the time these particular observations were made the fish was in a tank about twice its length and too narrow for it to turn readily.

The Musky is about three and a half feet long and its weight is estimated variously by different observers. A carp about a foot long was dropped behind it. It failed to make the turn at the first attempt but turned and caught the fish all in one movement a few seconds later. It held the carp firmly across the middle of the body while returning to its usual resting place. The solid teeth of the lower jaw were used. They were pressed into the fish firmly enough to cause some bleeding. When the resting place was reached, the carp was turned by a quick movement so that its head pointed down the big fellow's throat. Then the lower jaw was dropped so that the solid teeth did not interfere with the swallowing movements. The Carp was held entirely between the patch of hinged teeth on the tongue and those on the vomer and palatine bones. Swallowing was by a series of gulping movements in which the whole fish seemed to move forward, started and stopped by the pectoral fins. There was no indication of an alternate movement of different sets of teeth as there is in a snake. Each swallowing movement carried the Carp along only a fraction of

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an inch. The movements seemed to be the same as long as any part of the carp kept the mouth from closing. After the Muskalonge could close its mouth it was several minutes before it could be seen that the carp was passing out of the mouth and branchial cavity.

A small Grass Pickerel (*Esox americanus vermiculatus* LeSueur) had a slightly different method. It was about five inches long and the Goldfish about two, so the proportions seemed about the same. It seized the Goldfish head on at the first attempt and took it almost entirely into its mouth at the first gulp. It never released the hold of the solid teeth of the lower jaw until just at the moment of making another swallowing movement.

Several Pickerel (*Esox lucius* Linnaeus) weighing from two to five pounds were fed a number of Goldfish of about half a pound, each. Their method of feeding was various but it was hardly a fair test as many of them were suffering with the blindness that so often attacks this species in an aquarium, especially as the water warms up in the spring. Two or three of them swallowed Goldfish tail first. One or two tried the same trick and finally released the prey. None of them was able to turn the fish without losing it and none of them released the hold of the lower jaw except at the very moment of making a swallowing movement.

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OBSERVATIONS UPON LIVING

Xantusia henshawi

The little-known *Xantusia henshawi* Stejneger inhabits central San Diego County, California, where it lives in cracks behind flakes of granite so securely hidden that few people know how to find it. Mr. L. M. Klauber, Curator of Reptiles of the Zoological Society of San Diego, has solved the problem. On March 15, 1925, Mr. Klauber kindly collected and shipped alive to me four adults and three juveniles of this lizard.

Upon observing these lizards one notices immediately, besides the striking color pattern, the extraordinary flatness of the head and trunk. The head looks as if a stone had been dropped upon it. It is significant to note that an habitual response of the lizard to disturbance is flattening of body, legs and head tightly against the substratum. In captivity *Uta*, *Sceloporus* and *Callisaurus* are most easily picked up by one's gently putting a finger under the chin, after which the lizard responds by raising itself on its front legs and climbing onto the hand. But *Xantusia henshawi* allows only room for a stiff piece of paper to be inserted beneath its chin.

The Henshaw Night Lizard backs up, by a sinuous twist of the trunk, quite as easily as it moves forward. At times the long tail is raised partly off the substratum and curved in lateral undulations. This happens as a preliminary to jumping, for the lizard^{as} jump up or down with great swiftness. They can crawl much better than most species on relatively smooth surfaces and they can hold tenaciously with their sharp claws. In efforts to get out of a glass terrarium the sharp nose is pressed hard against the glass and used as a pivot for swinging the body. It is quite a different mode of procedure from that used by the stocky-bodied iguanids, and suggests that it

is used in seeking a passageway in the cracks of the granite. The feet are not used for digging as in sand-dwelling lizards.

These lizards breathe with great rapidity and do not hold the breath when startled as iguanids do. The breathing is like that of *Xantusia vigilis*. The center of the chin and the regions just back of the ears pulsate, as does also the trunk immediately behind the fore legs. These may all pulsate synchronously, or the pharyngeal pulsations may alone be in evidence. This type of breathing undoubtedly is associated with the great development of the lower cervical ribs and the absence of abdominal ribs.

The dark tongue is capable of much extension and is often used for cleaning the edges of the mouth. It is also used in drinking water as a means of carrying the water that adhered to it into the mouth. The process of drinking is thus much more protracted than it is in the case of the iguanids, where the water seems to be taken in by rapid suction.

In captivity the Henshaw Night Lizards eat larvae and adults of the flour moth. The method of getting food consists of arching the neck, pouncing upon and seizing the prey with the end of the pointed snout, firmly maintaining the grip for a relatively long time, and eventually turning the food so that it may enter the gullet lengthwise. In this as well as in its breathing and locomotory habits, *Xantusia* shows its relationships with *Gerrhonotus* and *Plestiodon* rather than with the Iguanidae.

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